string portion need extend below the tool **10** within the production tube string P.

Operation of the tool **10** (or **10***a*, depending upon the specific configuration of the threaded sucker rod ends, and couplings required) is essentially the same as that described above for the tool **10** of the pumping well W1 of FIG. **3**. Treatment fluid is delivered from a storage tank **32***a* to a treatment fluid pump **36***a* via a delivery line **34***a*, and thence to the upper sucker rod string R3 by means of a high pressure line **38***a*. Treatment fluid travels downwardly through the upper sucker rod string **R3**, until it reaches the tool **10** or **10***a* installed at the lower end thereof. The fluid then passes through the internal valve mechanism of the tool when sufficient pressure is provided by the treatment fluid pump **36***a* at the surface, to be distributed from the tool into the production fluid.

The treatment fluid or solvent then mixes with the production fluid in the fluid passage F between the tool **10** or **10***a* and the surrounding production tube string P, as in the case of the pumped well **W1**. Delivery of the mixed production and treatment fluids to the surface for further processing and storage is essentially identical to that described above for the pumped well **W1**, with the fluid mixture being delivered to an initial treatment area (not shown) and thence to a battery of storage tanks T via delivery lines and valves L. The mixture of paraffin solvent with crude oil serves to preclude the paraffin from settling out of solution with the oil as it cools in the storage tanks, thus obviating any periodic need to clean out the paraffin buildup in the bottoms of the storage tanks T.

In summary, the present well treatment tools **10** and **10***a* will be seen to provide a much needed means of providing simultaneous treatment for a producing well, without need to shut down well production for treatment. The present tool **10** may be operated continuously, if needed, but treatment may be provided on an intermittent basis as required or desired, merely by operating the treatment fluid pump at the surface accordingly. The present well treatment tool and system could be configured to operate automatically, if desired, by means of pressure or flow transducers in the output lines. If a drop in pressure or flow is detected, a signal could be sent to operate the treatment fluid pump to clear any paraffin or other buildup until normal well output pressure or flow is obtained, whereupon the treatment pump is stopped.

While the structure and function of the present invention has been described generally in connection with subterranean fluid wells of various types (water, oil, etc.), it should be noted that the present tool embodiments are of particular value in the oil industry for the elimination of paraffin buildup along the internal walls of the production tube string in such a well, as described further above. The treatment of the oil from a point before or below that at which the paraffin begins to solidify, throughout the remainder of the surface treatment and storage system at the well, ensures that well production will be maintained and that downtime for cleanout and treatment of paraffin residue in the surface system will be eliminated. Thus, the present tools **10** and **10***a* will be seen to pay for themselves in short order in the oil industry, and their usefulness in other subterranean fluid well treatment fields will be appreciated as well.

It is to be understood that the present invention is not limited to the sole embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

I claim:

1. A well treatment tool, comprising:

a generally cylindrical body for installing concentrically in line with a sucker rod string disposed generally concentrically within a production tube string and for distributing well treatment fluid from the sucker rod string and into the production tube string, with at least the portion of the sucker rod string disposed above said cylindrical body being hollow;

said body including an upper end having an axial fluid entrance passage therein for accepting treatment fluid from the sucker rod portion disposed thereabove, and an opposite solid lower end;

said body further including at least one treatment fluid distribution passage extending outwardly from said body;

valve means disposed within said body;

said valve means including an inlet end communicating with said fluid entrance passage and opposite outlet end communicating with said fluid distribution passage; and

attachment means disposed upon said upper end and said lower end of said body, for attaching said body to the sucker rod string.

2. The well treatment tool according to claim **1**, wherein the production tube string has an internal diameter, and said body has a maximum diameter smaller than the internal diameter of the production tube string to define a production fluid passage therebetween.

3. The well treatment tool according to claim **1**, wherein said valve means comprises a normally closed ball check valve.

4. The well treatment tool according to claim **1**, wherein said at least one treatment fluid distribution passage comprises a plurality of radially disposed passages extending from said outlet end of said valve, outwardly through said body.

5. The well treatment tool according to claim **1**, wherein said upper end and said lower end are externally threaded.

6. The well treatment tool according to claim **1**, wherein said upper end and said lower end are internally threaded.

7. A producing well having at least a production tube string and a sucker rod string disposed generally concentrically therein and, comprising in combination:

a well treatment tool having a generally cylindrical body for installing concentrically in line with said sucker rod string and for distributing well treatment fluid from said sucker rod string and into said production tube string, with said sucker rod string including at least a hollow portion disposed above said cylindrical body;

said body of said well treatment tool including an upper end having an axial fluid entrance passage therein for accepting treatment fluid from said sucker rod portion disposed thereabove, and an opposite solid lower end;

said body of said well treatment tool further including at least one treatment fluid distribution passage extending outwardly from said body of said well treatment tool;

valve means disposed within said body of said well treatment tool;

said valve means including an inlet end communicating with said fluid entrance passage and opposite outlet end communicating with said fluid distribution passage; and

attachment means disposed upon said upper end and said lower end of said body of said well treatment tool, for attaching said body to said sucker rod string.

8. The producing well and well treatment tool combination according to claim 7 wherein said production tube string has an internal diameter, and said body of said well treatment tool has a maximum diameter smaller than said internal diameter of said production tube string to define a production fluid passage therebetween.

9. The producing well and well treatment tool combination according to claim 7, wherein said valve means of said well treatment tool body comprises a normally closed ball check valve.

10. The producing well and well treatment tool combination according to claim 7, wherein said at least one treatment fluid distribution passage of said well treatment tool body comprises a plurality of radially disposed passages extending from said outlet end of said valve, outwardly through said body.

11. The producing well and well treatment tool combination according to claim 7, wherein said upper end and said lower end of said well treatment tool body are externally threaded.

12. The producing well and well treatment tool combination according to claim 7, wherein said upper end and said lower end of said well treatment tool body are internally threaded.

13. A method of treating a producing well having at least a production tube string with a hollow length of sucker rod string disposed generally concentrically therein, with the production tube string having a production fluid flowing upwardly therethrough to an initial treatment and storage system, the method comprising the following steps:

(a) providing a well treatment tool having a generally cylindrical body, an upper end having an axial fluid entrance passage therein for accepting well treatment fluid from the sucker rod portion disposed thereabove, an opposite solid lower end, and at least one treatment fluid distribution passage extending outwardly from the body;

(b) installing the tool concentrically in line with the sucker rod string at a predetermined depth in the well, with the fluid entrance passage communicating with the interior of the hollow sucker rod string;

(c) dispensing a well treatment fluid under pressure downwardly from the surface, through the sucker rod string to the well treatment tool;

(d) distributing the well treatment fluid from the treatment fluid distribution passage of the well treatment tool, into the production tube string; and

(e) flushing the well treatment fluid upwardly with the production fluid, through the production tube string and into the initial treatment and storage system.

14. The method of treating a producing well according to claim 13, including the step of providing a valve disposed within the body, with the valve including an inlet end communicating with the fluid entrance passage of the body and opposite outlet end communicating with the fluid distribution passage.

15. The method of treating a producing well according to claim 14, including the step of providing a normally closed ball check valve for the valve.

16. The method of treating a producing well according to claim 13, including the steps of:

(a) defining an internal diameter for the production tube string;

(b) providing a maximum diameter for the body of the well treatment tool, less than the internal diameter of the production tube string; and

(c) defining a production fluid passage between the internal diameter of the production tube string and the body of the well treatment tool.

17. The method of treating a producing well according to claim 13, including the step of providing a plurality of radially disposed treatment fluid distribution passages extending from said outlet end of the valve, outwardly through the body.

18. The method of treating a producing well according to claim 13, including the step of providing externally threaded ends for removably attaching the upper end and the lower end of the well treatment tool to the sucker rod string.

19. The method of treating a producing well according to claim 13, including the step of providing internally threaded ends for removably attaching the upper end and the lower end of the well treatment tool to the sucker rod string.

20. The method of treating a producing well according to claim 13, including the steps of:

(a) providing oil with a paraffin component mixed therein as the production fluid; and

(b) providing a paraffin solvent as the well treatment fluid.

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